

GENETICS
On-Level Seventh Grade Science
2011-2012

Description

Organisms can reproduce sexually (eukaryotes) and asexually (prokaryotes). Sexual reproduction requires two parents who both provide genes to the new organism during fertilization, resulting in offspring with a mix of inherited genes. In asexual reproduction, only one parent is needed, and offspring are genetically identical to the parent. In both cases, the genetic instructions necessary for development of offspring are contained inside the cell. This genetic material is responsible for the traits passed on to offspring. These ideas of heredity, or the passing of traits from parent to offspring, were first developed by the father of genetics, Gregor Mendel. Chromosomes, found in the nucleus of eukaryotic cells, are made up of genes, which in turn are made up of DNA, or deoxyribonucleic acid. An important property of DNA is that it has the ability to make copies of itself. This is important when cells divide because each new cell needs to have an exact copy of the DNA from the old cell. Emphasis is placed on the passing of traits from parent to offspring through replication of DNA during both asexual and sexual reproduction and predicting the diversity of offspring,

Connections

Almost every cell in every living organism contains genetic material. The genetic code passed on by the parent determines the diversity of the offspring. Diversity makes it possible for organisms to grow and thrive in a variety of environments under a multitude of varying conditions. Later units will emphasize adaptations of organisms that make it best suited to living in particular ecosystems and biomes, as well as how these adaptations arise over many generations due to patterns of gene frequency and the process of natural selection.

Enduring Understandings

1. Organisms can be divided into two groups, prokaryotes (without a nucleus) and eukaryotes (with a nucleus),
2. Organisms can reproduce asexually (prokaryotes) and sexually (eukaryotes).
3. During reproduction, genetic instructions are copied and passed on to offspring.
4. DNA is ultimately responsible for the traits passed on to offspring.
5. Dominance determines phenotypes of the offspring. A phenotype is the outward expression of a trait.

Essential Questions

1. What are the similarities and differences between prokaryotes and eukaryotes?
2. What are the similarities and differences between sexual and asexual reproduction?
3. How are traits passed on from parent to offspring?
4. Why do some traits show up more often than others?
5. How are some traits combined to produce new traits?

Essential Concepts and Skills

By the end of the unit, the student is expected to:

1. Compare and contrast prokaryotes and eukaryotes.
2. Compare and contrast asexual reproduction and sexual reproduction in both plants and animals.
3. Analyze the methods by which genetic material is reproduced and passed on to offspring.
4. Illustrate that chromosomes may be broken down into genes which are made up of DNA.

5. Predict the probability that certain traits will be present in offspring
6. Describe co-dominance and incomplete dominance.
7. Justify why sexual reproduction ensures diversity.

What do students typically have as misconceptions?

1. Daughters inherit most characteristics from their mothers, and boys inherit most from their fathers.
2. Sexual reproduction occurs in animals but not in plants.
3. Alleles and genes are the same thing.
4. Each box in a Punnett square represents a trait of one offspring, rather than a probability that the trait will show up.
5. DNA, genes, and chromosomes are separate structures inside the cell.

Preconception Survey

1. Why do children look like their parents?
2. How can a child have red hair, when neither parent has red hair?
3. What is DNA and where is it found?
4. How do plants reproduce?

Formative Assessment Items

1. Use microscopic models to distinguish between prokaryotes and eukaryotes.
2. Illustrate how meiosis ensures diversity by creating haploid cells
3. Predict traits of offspring using Punnett Squares.
4. Analyze a scenario to determine which traits are dominant and which are recessive.

TEKS Covered

7.14 Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:

- A) define heredity as the passage of genetic instructions from one generation to the next generation.
- B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction. ***Supporting Standard-Category 4***
- C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus. ***Supporting Standard-Category 4***

Vocabulary

meiosis, fertilization, sexual, asexual, inherit, heredity, diversity, Gregor Mendel, chromosomes, nucleus, DNA, reproduction, Punnett Square, alleles, genes, phenotypes, genotypes, dominant, recessive, co-dominance, incomplete dominance, sexual reproduction, asexual reproduction, prokaryotic, eukaryotic